Claims 1-11 were rejected under 35 USC 103(a) as being unpatentable over Argo et al. '978 in view of Maxwell '921 and further in view of Katznelson '100, wherein the Examiner asserts that Argo discloses a transmitter, comprising a multi-signal generator for providing a plurality of signals within a selected frequency band and having a center frequency and a relative frequency spacing of said simultaneous plurality of signals for transmitting plurality of frequency signals of the entire frequency spectrum bands, for simultaneously transmitting on AM, FM radio frequencies, using AM and FM band comb frequency generators, wherein divide means 100, mixer 200 and multiply-by-9 in 430 for providing the frequency spacing. The Examiner asserts that Argo discloses a modulator connected to said multi-signal generator for selectively and simultaneously modulating said plurality of signals, i.e., the varactor modulator 390 and the AM modulator 260. The Examiner further admits that Maxwell does not teach "selectively controlling the center frequency..."

Applicant notes that the Examiner has erroneously construed the construction, function and teaching of Argo that Argo does or can (even with Maxwell) "provide a plurality of signals within a selected frequency band and having a center frequency and relative frequency spacing of said simultaneous plurality of signals..." Instead, Argo comb generates a surplus of frequencies extending beyond the AM band: "An AM band combination comb generator 100 generates a one megahertz (MHz) carrier frequency with plus and minus 60 side bands in ten kilohertz (KHz) increments." col 3,

lines 26-29, providing signals at least from 400 to 1600 KHz, beyond the AM band. "The band pass filter block allows the frequencies in the AM band from 550 KHz to 1600 KHz to pass." col 3, lines 33-35, and "The high pass filter 230 allows frequencies above 550 KHz (0.55 MHz) to pass." col 5 lines 33-34 and "The low pass filter allows only frequencies below 1600 (1.6 MHz) to pass." col 5, lines 37-38, clearly stating and further implying that the band of frequencies generated is defined by the high pass and low pass filters, which would still define the same band of frequencies regardless of how any comb signal (e.g. carrier or sideband) was changed. Furthermore, Argo teaches fixed bands of frequencies as there is no teaching, provision or allowance in Argo in which the band of frequencies (or the high pass and low pass filters) is (are) or can be changed.

The Examiner further erroneously construes the construction of Argo regarding the FM band. Argo generates a surplus of frequencies beyond the FM band, to be limited by the filters: "The bandpass filter block 480 includes two filters, a high pass filter 490 and a low pass filter 500. ... The high pass filter 490 passes only frequencies above 88 MHz. The low pass filter 500 passes only frequencies below 108 MHz." col 6, lines 37-42. Thus Argo clearly implies that a surplus of signals are generated beyond the 88-108 MHz band, and that it is the high and low pass filters which define the band of signals generated, not the comb FM frequency generator 400.

Applicant further notes that the embodiments shown and

discussed in Argo provide is no structural or functional limitations to the number of sidebands generated by either the AM or FM comb signal generator to well beyond their desired frequency bands, the band of frequencies finally generated are delimited *only* by the respective band pass filters 220 and 480, and further that adjusting either signal into the mixer 460 (or 200) would not effect the band of frequencies generated.

The Examiner argues that Maxwell teaches the center frequency is selectively adjusted to cover at least a portion of the selected frequency band (by DDS 112 and step 304), and teaches a control unit for controlling at least one of the multi-signal generator center frequency and relative frequency spacing by controller 44 at terminal 54, and where the DDS 112' receives the controlling signal 120 from the control block 118. Moreover, the Examiner concludes that it is obvious to one of ordinary skill in the art at the time of invention to modify Argo to include Maxwell's selectively controlling the center frequency and frequency spacing, and that by so doing, Argo's system would flexibly change the center frequency and frequency spacing.

Applicant notes that Maxwell Mixer 40 and Frequency Controller 44 provides signals in the 88-108 MHz FM band by direct synthesis and stepping (i.e. one frequency at a time) thru a 20 MHz range. For any combination of a frequency from the Frequency Controller (in the range of 2.5 - 22.3 MHz) and the Modulator 36 (85.6 MHz), a single resulting frequency in the 88-108 MHz band is produced, col. 6, line 56 to col. 7, line 4, (although it is changing at

the stepping rate). However, Argo teaches mixers 200 and 460 in response to two input signals, provide a comb of (multiple) frequencies, which Maxwell's structure cannot and will not provide in Maxwell or in Argo if substituted as suggested by the Examiner.

By contrast, the present invention according to claim 1, as twice amended, includes:

> "a multi-signal generator for simultaneously providing a plurality of signals within a selected frequency band and having a center frequency and relative frequency spacing of said simultaneous plurality of signals, wherein
> said center frequency is selectively adjusted to cause said plurality of signals to cover a corresponding selected portion of the selected frequency band;
> a modulator connected to said multi-signal generator for selectively and simultaneously modulating said plurality of signals; and
> a control unit for selectively controlling said multi-signal generator center frequency

not found in the cited art of record.

The invention of Claim 1 provides a generator which simultaneously provides a plurality of signals *within* a selected frequency band, where Argo covers the <u>entire</u> band and is fixed in frequency.

The invention of Claim 1 provides a generator which center frequency is adjusted to cause said plurality of signals to cover a corresponding selected portion of the selected frequency band, whereas Argo neither teaches, discloses or suggests, nor is capable (even combined with Maxwell) of adjusting a center frequency and a corresponding portion of the selected band as Argo covers the entire band and is <u>fixed</u> in its high and low ends as defined by <u>fixed</u> filters. Moreover, the concept of center frequency as claimed is irrelevant to and absent in Argo, as the center of his

AM band is 1075 KHz, a frequency that is never generated and nowhere present in the Argo reference.

Applicant again argues that the Argo disclosure is erroneous, inoperative and misleading and does not provide a teaching on which the rejection may be based. As argued in a prior Response, Applicant notes that on both the AM and FM generators, linear mixers 200, 460 respectively, are used and receive likely substantially pure sine wave modulation signals via the respective band pass filters 160, 180 and 440 to modulate the respective fixed carriers. As is well known, when linear mixers receive two input signals, e.g. A and B, by definition provide four, and only four output signals, A, B, A+B and A-B. If we define the RF carrier to be A and the modulating signal to be B, where B << A, only the carrier A (e.g. 1000 KHz) and the two sidebands, A-B and A+B (e.g. 990 KHz and 1010 KHz) remain, and if the amplitude of A and B are proper only A+B and A-B, not a comb of signals covering either (AM or FM) band. Note Argo's own use of the linear mixer 260 as the audio modulator. Therefore, Argo is inoperative as described, or insufficiently or confusingly disclosed, thus rendering the Examiner's combination clearly unreceiveable and/or inoperative.

Nothing in Applicant's prior arguments should have precipitated the search for or citation of Katznelson, who teaches a variable *phase* comb generator which provides a periodic waveform containing all harmonics of the fundamental frequency, col. 13, lines 3-17, emphasis added. Katznelson's phase control is irrelevant to the claimed invention. The claimed center frequency

generation and control is not taught or suggested, and Katznelson is not adaptable to such without becoming inoperative or by undue experimentation.

Regarding the rejection of claims 2 and 3, wherein the Examiner asserts that Maxwell's DDS provides said plurality of signals, Applicant notes that in Maxwell, the DDS wave in the ROM 204 provides a single frequency only as illustrated in col. 7, lines 13-15, which is serially stepped to another frequency. By contrast, the present claimed invention according to claims 2 and 3 includes "a wave memory for reproducing a selected wave form output signal providing said *plurality* of signals" not found in the art, either alone or in combination. Thus Maxwell teaches a structure wholly different from the claimed structure.

Further regarding the rejection of claim 3, the Examiner's assertion of a plurality of frequencies generated by Argo, Applicant notes that Argo shows no claimed wave memory.

Regarding the rejection of claim 4, the Examiner's argument that Maxwell's control unit transfers wave forms to the wave memory is clearly without support as the wave ROM is a "READ-only" memory, and Fig. 4 shows only an address input. By contrast, the invention according to claim 4 includes a "control unit [which] provides pre-stored wave forms selectively transferred to said wave memory to provide said plurality of signals on a corresponding portion of said selected band" not found in the cited art, alone or in combination.

Regarding the Examiner's rejection of claims 7-9, Applicant

again argues that the Examiner's combination is not possible (except by undue experimentation), let alone obvious, to provide an operable apparatus as argued above.

The remaining claims dependent on claim 1 also provide additional inventive features to further patentably distinguish the claimed invention over the cited art. Applicant therefore believes that the rejection of claims 1-11 under 35 USC 103(a) as being unpatentable over Argo et al. '978 in view of Maxwell '921 and Katznelson '100 is overcome.

Claims 12-16 were rejected under 335 USC 103(a) as being unpatentable over Argo in view of Katznelson, Maxwell and further in view of Wilson '868. With regard to claims 13-16, the Examiner argues that Maxwell shows first and second signal generators having DDS outputs 114 for both the FM and AM band spaced frequencies, the control means 118, the mixer, the power amplifier 132, 162, referring to a plurality of carrier signals from Argo.

Applicant notes that the AM and FM channels are entirely separate, with entirely separate power amplifiers and transmitting antennas.

Applicant notes that in Maxwell, the disclosure of the signal or signal generation from the DDS to the AM modulator on interface 154 is omitted.

Applicant notes that Katznelson teaches phase control only, the frequencies being fixed.

By contrast, the invention according to claim 13, as previously amended, includes:

> "a first signal generator for simultaneously providing a plurality of carrier signals within a frequency band and having a relative frequency spacing, and including an amplitude modulator of said plurality of said plurality of signals according to a modulation signal;
>
> a second signal generator for selectively providing a selectable frequency signal, and including a frequency modulator of said selectable frequency according to a modulation signal;
>
> a mixer receiving the output signals of said first and second signal generators, and providing an output signal;...and
>
> a control means for selectably enabling said first signal amplitude modulator in a first mode, and said second signal generator frequency modulator in a second mode

not found in the cited art of record. Applicant first argues that none of the cited art teaches, discloses or suggests the claimed mixer receiving said output signals as both Argo and Maxwell have separate amplifiers and antennas. The switch 209 in Wilson is not literally the same or equivalent to the claimed mixer. Furthermore, as previously argued, Argo and/or Maxwell, alone or in combination and now Wilson do not teach, suggest or disclose the claimed first signal generator for providing a plurality of carrier signals within a frequency band, or a claimed control means for selectively enabling the first and second modulators. Moreover, the structure and teaching of Argo is entirely different from the present invention wherein Argo has entirely separate AM and FM signal generation channels and does not teach the claimed controllably enabled modulators whose output signals are mixed to provide the signal which is ultimately sent to the antenna.

Regarding the rejection of claim 15, none of the cited art alone or in combination provides, teaches or suggests the claimed "...selected portions substantially comprise said frequency band"

for the reasons of non-disclosure, non-obviousness and inoperability discussed, above.

Regarding the rejection of claim 16, wherein:

> "said first signal generator comprises means for providing a plurality of signals in at least one selected portion of said frequency band according to said control unit, and
> said second signal generator provides said selectable frequency signal according to said control unit,
> wherein said mixer output signals comprise selected portions which substantially comprise said frequency band

not found in the cited art as the claimed mixer is not taught, discussed or suggested.

The remaining dependent claim 14 provides additional inventive features to further patentably distinguish the present invention over the cited art of record. Applicant thus believes that the rejection of claims 12-16 under 35 USC 103(a) as being unpatentable over Argon view of Katznelson, Maxwell and Wilson '868 is overcome.

Claims 17-20 were rejected under 35 USC 103(a) as being unpatentable over Argo in view of Katznelson, Maxwell as applied to claim 1, and further in view of Schlosser '194. The Examiner argues that Schlosser teaches the calculating of the amplitude/phase variance for controlling the amplitude and phase using weighing factors deducted from the variance of the amplitude/phase, and that "the summer for summing the weighted signals to produce a final output transform signal with best signal component enhanced (sic)", and that it would be obvious to Schlosser's weighing factor of the amplitude and phase control using calculated variance from amplitude and phase, such that the system could be upgraded for controlling the amplitude and phase variations of the summed

carriers using the calculated variance. The Examiner further argues that it would have ben obvious to one of ordinary skill in the art to modify and include Schlosser's weighing factor of the amplitude and phase control using calculated variance from amplitude and phase, to Argo awl modified above, such that the system could be upgraded for controlling the amplitude and phase variations of the summed carriers using the calculate variance.

While Schlosser uses the familiar terms "variance of amplitude" and "variance of phase", the end result of his teaching, "...to produce a final output signal which has its best performing signal component enhanced relative to the other component. "Best" is defined herein as most likely to succeed at suppressing interference in a received signal." col. 2, lines 26-30, is very different from the claimed method. Schlosser's method clearly is directed to avoid a specific signal. The present invention is the complement, to provide "...simultaneous multi-carrier transmission..." whose constituent steps according to claim 17 are not taught, disclosed or suggested by Schlosser, which cannot be modified, adapted or upgraded without undue experimentation.

Schlosser's signal is a *single* carrier but as 2 quadrature signals X and Y, which are used to continuously calculate the variances of the Amplitude and Phase differences and average amplitude, which are ultimately used to choose from among several signals, col. 3, lines 58-66, col. 8, lines 3-31.

By contrast, the inventive method according to claim 17, comprises the steps of:

"selecting a set of carrier frequencies;
providing a corresponding sum of sine wave signals each corresponding to one of the set of carrier frequencies;
dividing the sum into a number of segments in the time domain;
calculating a variance of the magnitudes of each said segment;
changing the phase relationship of said sine wave signals to minimize the variance;
repeating the steps of calculating and changing until the minimization of the variance from said changes is less than a desired threshold significance value; and
transmitting a signal corresponding to said sum of said sine wave signals

not found in the cited art of record. Katznelson is irrelevant, producing only "incremental phase changes" col 10, line 39 and 46, to iteratively provide its goal, and at least not the claimed steps of providing the corresponding sum... and dividing the sum into a number of segments.... as claimed. Maxwell apparently does not teach nor can accommodate any change in phase or summation of carriers as it merely steps thru the selected carriers, as discussed above. Regarding Schlosser's use of the calculated variance to determine weighing factors ultimately used to select one of three signals, Schlosser does not teach nor suggest the claimed steps of changing the phase relationships of the sine wave signals (or step of repeating the steps) since Schlosser discloses no method or means of controlling the phase of the received signals, nor can it change phase of any of the signals, since by definition, the signals are fixed, being a quadrature (90°) pair of a single received signal. Argo makes no contribution to support the Examiner's rejection as Argo's signals are mere comb frequency generations, having no phase measurement or ability to change any one signal without changing all generated signals. Furthermore,

the Examiner has not yet indicated exactly how he proposes (where to connect the hardware, or modify the flow of signal generation) to combine Argo and the other references, making further response by the Applicant impossible. Moreover, the Examiner's scheme of somehow integrating Schlosser and Argo is nowhere taught, suggested or disclosed, and would neither work at all or as claimed, nor could be done without undue experimentation. Any such combination as argued by the Examiner would result in a structure from which the presently claimed invention is instantly and completely patentably distinguishable. Applicant asserts that the cited art does not even mention or has the capacity to implement the steps (e.g. selecting a set of carrier frequencies, changing the phase) as claimed, let alone do so in a manner which teaches, discloses or suggest the claimed invention alone or in combination.

Furthermore, the claims dependent on claim 17, now distinguished from the cited art, provide additional inventive features to further patentably distinguish the present invention over the cited art of record. Applicant therefore believes that the rejection of claims 17-20 under 35 USC 103(a) as being unpatentable over Argo in view of Katznelson, Maxwell and further in view of Schlosser '194 is without support, improper and should be withdrawn, or in the alternative, is overcome.

Claims 21, 22 were rejected under 35 USC 103(a) as being unpatentable over Argo in view of Katznelson, Maxwell in further view of Hunsinger '396. The Examiner argues that Hunsinger claim 21 teaches modulating said signal corresponding to the sum of said

sine wave signals, etc. and front figure, abstract, col. 9, lines 54-58 teach simultaneous transmission of AM over FM to the broadcast band using the sum 22 for generating the composite AM over FM signal, and that Maxwell teaches single signal stepping and the generation of various frequencies.

Claims 21,22 are dependent on claim 17, previously patentably distinguished, above. The claimed steps of "modulating said signal corresponding to the sum of said sine wave signals" and "change the phase relationships...) are not taught, discussed or suggested as none of the cited art teaches a summation of sine wave signals nor the adjustment of signal phase relationships, as discussed above. The entire essence of Hunsinger is to be "in-band" and "on-channel" meaning a single broadcast band channel frequency. The entire essence of Argo is to simultaneously cover the entire band selected. Since the cited patents have entirely different structure, methods of operation and outcomes, any combination of the two teachings is fundamentally impossible according to each of the patents, which cannot be modified to yield an operable combined system. Applicant asserts that the rejection is improper, without support and must be withdrawn. Furthermore, the claims dependent on claim 17 provide additional inventive features to further patentably distinguish the present invention over the cited art of record. Therefore, Applicant believes that the rejection of claims 21, 22 under 35 USC 103(a) as being unpatentable over Argo in view of Katznelson, Maxwell in view of Hunsinger '396 is improper and without support and should be withdrawn, or in the alternative, is

overcome.

Again, Applicant asserts that in each and every Examiner's rejection, above, the Examiner has failed to provide a *prima facia* basis for his rejection. Applicant argues that the rejections are insufficient, improper or inapplicable and should be withdrawn, or in the alternative, are all overcome. Applicant further argues that no new arguments have been raised to necessitate or permit a Final rejection to issue.

Applicant, having amended claim 1 to more clearly claim the present invention and to expedite the prosecution, and having overcome the rejections to the present patent Application, believes that the present application is in condition for allowance. Applicant respectfully requests reconsideration and allowance of the present application. The Examiner is requested to call the Applicant's undersigned attorney upon initial review of this Amendment to expedite prosecution of the present application.

Respectfully submitted,
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1. (twice amended) A transmitter, comprising:

a multi-signal generator for simultaneously providing a plurality of signals within a selected frequency band and having a center frequency and relative frequency spacing of said simultaneous plurality of signals, wherein

said center frequency is selectively adjusted to cause said plurality of signals to cover ~~at least~~ a portion of the selected frequency band;

a modulator connected to said multi-signal generator for selectively and simultaneously modulating said plurality of signals; and

a control unit for selectively controlling ~~at least one of~~ said multi-signal generator center frequency ~~and relative frequency spacing~~.

2. (original) The transmitter of claim 1, wherein said multi-signal generator further includes a wave memory for reproducing a selected waveform output signal providing said plurality of signals.

3. (original) The transmitter of claim 2, wherein said wave memory output signal comprises a plurality of signals corresponding to a different portion of said selected band.

4. (original) The transmitter of claim 3, wherein said control unit provides prestored waveforms selectively transferred to said

wave memory to provide said plurality of signals on a corresponding portion of said selected band.

5.(original) The transmitter of claim 2, further including a waveform converter connected to receive said reproduced selected waveform output signal and provide a converted output signal.

6.(original) The transmitter of claim 5, further including an audio source comprising one of an audio memory for providing a prestored audio signal selected by said control unit, and a microphone, said audio source being selectively connected to said converter to therein amplitude modulate the waveform output signal.

7.(original) The transmitter of claim 2, further including a programmable signal generator providing a programmable output signal and a mixer receiving said programmable output signal and said converted output signal and providing a mixer output therefrom, wherein said programmable output signal is selectively varied to provide a plurality of signals at different portions of a selected band.

8.(original) The transmitter of claim 7, wherein said programmable signal generator is controlled by said control unit to selectively provide different output signals, which when received by said mixer, provides said plurality of signals corresponding to substantially all of said selected frequency band.

9.(original) The transmitter of claim 8 further including a frequency modulator connected to said programmable signal generator for frequency modulating the output signal thereof according to an audio signal.

10.(original) The transmitter of claim 9 further including an audio source comprising one of an audio memory for providing a prestored audio signal selected by said control unit, and a microphone, said audio source being selectively connected to said frequency modulator to modulate programmable signal generator output signal.

11.(original) The transmitter of claim 10, further including an audio source comprising one of an audio memory for providing a prestored audio signal selected by said control unit, and a microphone, said audio source being selectively connected to said frequency modulator.

12.(original) The transmitter of claim 7, further including a power amplifier selectively receiving from one of said mixer output signal and said converted signal, and providing a transmitter output signal.

13.(amended) A dual-mode transmitter, comprising:

a first signal generator for simultaneously providing a plurality of carrier signals within a frequency band and having a

relative frequency spacing, and including an amplitude modulator of said plurality of said plurality of signals according to a modulation signal;

a second signal generator for selectively providing a selectable frequency signal, and including a frequency modulator of said selectable frequency according to a modulation signal;

a mixer receiving the output signals of said first and second signal generators, and providing an output signal;

a power amplifier for selectively receiving said signals corresponding to said plurality of signals from said first signal generator and said mixer output signal, providing a signal to an antenna according to said selectively received signal; and

a control means for selectably enabling said ~~first~~ signal amplitude modulator in a first mode, and said second signal generator frequency modulator in a second mode.

14.(original) The transmitter of claim 13, further comprising an audio source comprising one of an audio memory for providing a prestored audio signal selected by said control unit, and a microphone, said audio source being selectively connected to said amplitude modulator and said frequency modulator.

frequency signal according to said control unit,

wherein said mixer output signals comprise selected portions which substantially comprise said frequency band.

(original) A method of providing simultaneous multi-carrier transmission, comprising the steps of:

selecting a set of carrier frequencies;

providing a corresponding sum of sine wave signals each corresponding to one of the set of carrier frequencies;

dividing the sum into a number of segments in the time domain;

calculating a variance of the magnitudes of each said segment;

changing the phase relationship of said sine wave signals to minimize the variance;

repeating the steps of calculating and changing until the minimization of the variance from said changes is less than a desired threshold significance value; and